6. METEOROLOGY AND HYDROLOGY

The Hydrologic Cycle—Markov Renewal Approach

K. Achuthan, *Department of Civil Engineering, Annamalai University, Annamalainagar-608 002, Tamilnadu, India*

Hydrology is an earth science concerned with the distribution of water quantities and water qualities in time and space. It is also the scientific examination and apparaisal of the whole continuum of a hydrologic cycle. In this paper, the hydrologic cycle will be investigated by a Markov renewal approach.

Stochastic Prediction of Rainfall

P.P. Kamte and S.D. Dahale, *Indian Institute of Tropical Meteorology, Pune-5, India*

The pentad rainfall of Pune is classified into four states based on different rainfall thresholds. Stochastic matrices for each one of the pentads covering the four monsoon months (June to September) and for the four states are computed. Such stochastic matrices give sets of transitional probabilities which describe how in the past weather behaved subsequent to initial conditions and are used as a first guess to predict the subsequent pentad rainfall. 70 years (1901–1970) pentad rainfall data of Pune are used as a dependent data set to obtain the transitional probabilities for each of the pentads of the monsoon period. Such a scheme is tested on three years (1971–1973) independent data set in predicting the state of the next pentad once the initial state is known. The technique gives a skill score of 0.44. This shows that the technique could be an aid to an operational meteorologist in making probability estimates of a specific future weather event.

Application of Stochastic Processes to Monsoon Rainfall

R.H. Kripalani, *Indian Institute of Tropical Meteorology, Pune-411 008, India*

The dependence in rainfall occurrence is examined by using Akaike's information theoretic criterion (AIC) and Schwarz's Bayesian Criterion (SBC) as decision making criteria. In the majority of cases a third order model is found suitable by AIC and a second order by SBC. The dependence in each type of event (rain/no rain) is also examined by considering the runs of dry and wet spells as an alternate renewal process and fitting Markov chain models of order 1, 2 and 3 and log and modified log models. These results lead us to believe that a Markov Chain model of order more than one is required to represent monsoon rain events.